

Symmetry properties of a charged fluid in the general theory of relativity

Mukhamedov A.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

The problem of specifying the symmetry properties of a charged fluid in space-time V_4 , which has a definite group of motions, is considered. It is shown that if nonempty spacetime V_4 with an energy-momentum tensor for the charged fluid has symmetry (i.e., admits a group of motions), then the mass density, the pressure, and the four-velocity of the fluid inherits this symmetry, and for an electromagnetic field the relation $L\xi_{fij} = 7 \cdot f_{ij}$ is satisfied. The necessary and sufficient conditions are found so that $\chi = 0$ in the case of a one-parameter group. Then additional relationships between κ and the structure constants are obtained in the case of an r -parameter group. It is shown that under certain conditions the symmetry properties obtained for charged matter are necessary and sufficient conditions for the symmetry of space-time V_4 . © 1979 Plenum Publishing Corporation.

<http://dx.doi.org/10.1007/BF00890360>
